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(56) Documents Cited

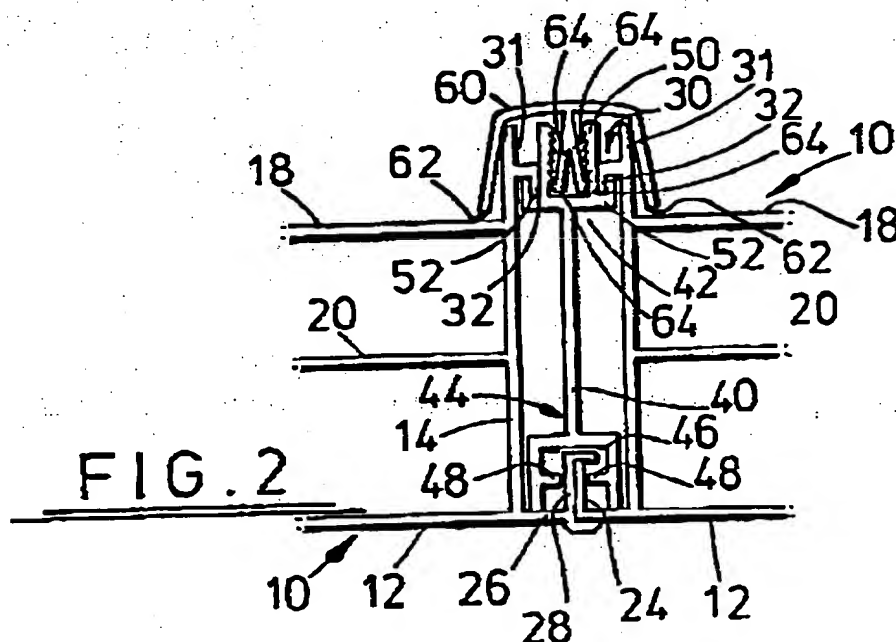
 GB 2243170 A GB 2155527 A GB 2147334 A
GB 1528874 A GB 1511189 A GB 1201427 A
EP 0054856 A US 4790112 A

(58) Field of Search

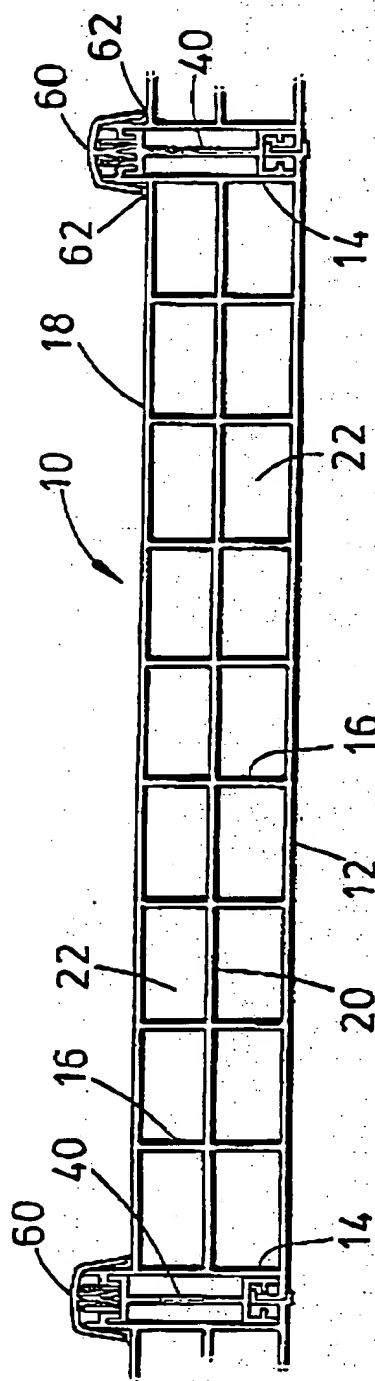
 UK CL (Edition L) E1D DCF DLEHW DLEQWCV
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INT CL⁵ E04D

(54) Hollow roofing panels

(57) A hollow roofing panel (10) of plastics material comprises one or more hollow ducts (22) and has at opposite sides thereof lower coupling members (24, 26), whereby elements may be connected to each other directly or indirectly, wherein the ducts are generally rectangular and formed between generally flat bottom and top walls (12 and 18 respectively) and vertical end (14) and intermediate walls. A stiffening beam (40), e.g. of aluminium engages the lower coupling members (24, 26, and also upper formations (32, 52) and has a barbed groove (50) for retaining a capping (60) with flexible edges (62) and resilient projections (64) for engaging the barbs.



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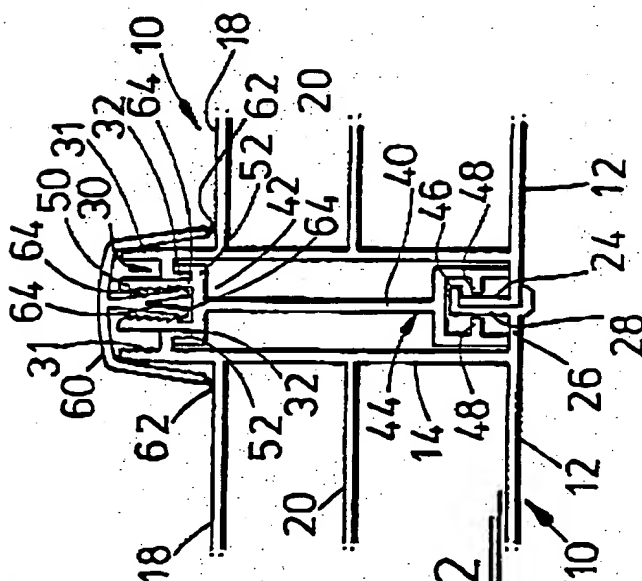


FIG. 2

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Title: Structures

DESCRIPTION

This invention concerns building elements for making building structures, especially for making roofs.

5 Self-supporting roofs or roof sections are known which comprise a plurality of extruded plastics profile elements connected side-by-side, each element having at least one longitudinal chamber and coupling members by which neighbouring profile elements are interconnected,
10 the adjacent coupling members of neighbouring profile elements engaging to form a duct.

In UK Patent Specification No. 1528874 the coupling of adjacent panels form together a duct through which is inserted a longitudinally elongate locking
15 member, the locking member having at least two opposite longitudinal edges that are a sliding fit within said duct so as to prevent the locking member from twisting under load.

In UK Patent Specification No. 1511189 it was
20 further proposed that the longitudinal chamber of each element has an internal partition substantially parallel to the outer surfaces of a building unit made up of said elements. That partition is principally to provide additional heat insulation.

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Further proposals for such profile elements have been made in European Patent Specification No. 0070930A, in which multiple duct elements have main ducts and intermediate secondary ducts having internal partitions that are in line. Connection of elements to each other is as disclosed in UK Patent Specifications Nos. 1511189 and 1528874. The multiple duct elements were proposed mainly to reduce construction time of a roof as compared with using single duct elements.

10 A yet further proposal for such elements was made in UK Patent Specification No. 2147334B, in which upper coupling members consist of cylindrical, slotted, downwardly open flanges of such dimensions that a flange of a first element can be snap locked to a flange of a second identical element, In addition the lower end of one side wall of an element is integrally connected to a guide member which is adapted to engage the anchoring member of an adjacent element so as to maintain the lower ends of two adjacent side walls in spaced relationship so as to form a tight connection between such elements.

Each of these elements has to be secured, usually by means of screws, before the next element can be connected, which can be time-consuming and does not readily permit later adjustments of element positions.

Furthermore, there is a limit to the reasonable

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span of such elements for strength purposes. Even multiple duct elements have a limited span because they have main ducts based on single duct elements which themselves have a structural limit on their width.

5 An object of this invention is to provide an improved building element.

 According to a first aspect of the invention there is provided a hollow building element of plastics material comprising a plurality of hollow ducts and
10 having at opposite sides thereof coupling members, whereby elements may be connected to each other directly or indirectly, wherein the ducts are generally rectangular and formed between generally flat top and bottom walls and vertical end and intermediate walls.

15 Preferably the elements have an intermediate wall parallel to the bottom walls, whereby two series of ducts one on top of the other are provided. The intermediate wall may be of thinner section than the top or bottom walls of the building element.

20 According to a second aspect of the invention there is provided a hollow building element of plastics material comprising one or more hollow ducts and having at opposite sides thereof coupling members, whereby elements may be connected to each other directly or
25 indirectly, wherein upper coupling members comprise a part engageable with a separate member.

According to a third aspect of the invention there is provided a hollow building element of plastics material comprising one or more hollow ducts and having at opposite sides thereof coupling members, whereby
5 elements may be connected to each other directly or indirectly, whereby lower coupling members comprise formations that interengage with formations of neighbouring elements and are held together by a separate member.

10 The separate member of the second and third aspects of the invention may be the same member having upper and lower formations for engagement with upper coupling members and for holding together lower coupling members respectively. The separate member is
15 preferably in the form of a stiffening beam.

The building element of the second and third aspects of the invention is preferably a building element of the first aspect of the invention.

A preferred upper coupling member comprises a
20 flange forming a channel section which is engageable in a complementary channel section of said separate member or beam.

Preferred lower coupling members comprise a first member that is a vertical channel into which a
25 second member fits, the separate member having a formation that fits over said engaged first and second

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members to hold them together.

For coupled building elements according to the invention it is preferable to provide a cap or cover over the area of the coupling to prevent water ingress. Preferably the cap or cover is securable to said separate member or stiffening beam. The cap or cover preferably has at its side edges sealing means in the form of flexible resilient material. The separate member or stiffening beam preferably has a formation engageable with a formation of the cap or cover to retain the cap or cover in place. The separate member or stiffening beam may have a channel formation into which one or more depending projections of the cap or cover locate. Preferably the cap or cover has two such projections shaped to engage complementary formations on inside surfaces of the channel of the separate member or beam. The projections are preferably resilient and angled away from each other, whereby they will tend to urge outwards when pressed together and so improve engagement in the channel formation.

The preferred structure of the building element of the invention may permit elements of greater width than hitherto to be made, possibly of the order of 0.5m. The earlier described building elements are generally only made to about 0.25m.

This invention will now be further described, by

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way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is an end view of a building element according to the invention; and

5 Figure 2 is an enlarged view showing detail of coupling elements of Figure 1.

Referring to the accompanying drawings, a building element 10 for forming building structures, such as roofs, is shown made of translucent plastics material, such as polycarbonate, by extrusion. The element 10 is generally hollow having relatively thin walls. The element 10 has a flat bottom wall 12, upstanding end walls 14, upstanding intermediate walls 16, a flat top wall 18 and an intermediate wall 20 parallel to and equidistant from the top and bottom walls 18 and 12 respectively. The intermediate wall 20 will probably be of thinner section than the top or bottom walls 18, 12 respectively. Thus, the building element 10 comprising a plurality of rectangular section ducts 22 arranged in two rows one on top of the other.

At each end of the building element 10 are upper and lower coupling members. At one end, the lower coupling member 24 is an L-shaped extension of lower wall 18 and at the other end lower coupling member 26 comprises an extension of the lower wall 18 with a vertical channel section 28 formed thereon into which

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the lower coupling member 24 of the other end of an adjacent building element can fit.

5 The upper coupling members 30 at each end of the building element comprise vertical extensions 31 of side walls 14 and downwardly open channel forming members 32 extending therefrom. The upper coupling members do not actually engage each other but engage a stiffening beam 40 inserted between building elements that are brought together end to end.

10 The stiffening beam 40, preferably extruded from aluminium, has upper and lower formations 42 and 44 respectively whereby adjacent building elements 10 are held together. The lower formation 44 comprises a downwardly opening channel 46 having a pair of opposed
15 internal projections 48 that extend towards each other but do not meet. The formation 44 is sized so that when the lower coupling elements of adjacent building elements are brought together they fit between the projections 48 thereby holding them together.

20 The upper formation 42 of the beam 40 comprises an upwardly opening channel 50 having its internal side walls serrated. Extending outwards from opposite sides of the channel 50 in line with its base are L-shaped projections 52. The projections 52 are sized and
25 shaped each to engage channel members 32 of upper coupling member 30, thereby holding adjacent elements 10

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in a fixed relationship.

The connection between a pair of building elements 10 is covered by a capping 60. The capping 60 comprises a channel section extrusion having flexible edges 62 for forming seals with top walls 18 of the elements 10 and a pair of internal downwardly depending resilient projections 64. The projections 64 are angled apart and each has a lip 66 at its distal end to engage the serrations of the channel 50 of beam 40.

Thus, when the cap is pressed downwards with the projections 64 inserted into the channel 50, the projections 64 are urged together but once the capping has reached its seating, the projections will tend to press outwards so that their lips 66 engage with the serrations of channel 50 to retain the capping in place with its sealing edges against the top walls 18 of the adjacent building elements.

To construct a roof using building elements 10, the elements are laid side-by-side on a structure providing support at opposite ends of the elements with their lower coupling elements engaged. A stiffening beam 40 is then slid into the space between the elements to fix the lower coupling members and engage the upper coupling members of the elements. Then a capping 60 is pressed into the beam 40 until it seats onto the adjacent elements sufficiently to form a seal

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between the edges of the capping and the top walls of the adjacent elements.

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CLAIMS

1. A hollow building element of plastics material comprising a plurality of hollow ducts and having at opposite sides thereof coupling members, whereby elements may be connected to each other directly or indirectly, wherein the ducts are generally rectangular and formed between generally flat top and bottom walls and vertical end and intermediate walls.

2. An element as claimed in claim 1, having an intermediate wall parallel to the bottom wall, whereby two series of ducts one on top of the other are provided.

3. An element as claimed in claim 2, wherein the intermediate wall is of thinner section than the top or bottom wall of the building element.

4. An element as claimed in claim 1, 2 or 3, wherein upper coupling members comprise a part engageable with a separate member.

5. An element as claimed in any one of claims 1 to 4, wherein lower coupling members comprise formations that interengage with formations of neighbouring elements and are held together by a separate member.

6. An element as claimed in claim 5, wherein the separate member for the upper coupling members and the separate member for the lower coupling members is a

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single member having upper and lower formations for engagement with upper coupling members and for holding together lower coupling members respectively.

5 7. An element as claimed in any one of claims 4 to 6, wherein the separate member is in the form of a stiffening beam.

8. An element as claimed in any one of claims 4 to 7, wherein the or an upper coupling member comprises a flange forming a channel section which is engageable in
10 a complementary channel section of said separate member or beam.

9. An element as claimed in any one of claims 4 to 8, wherein a lower coupling member comprise a first member that is a vertical channel into which a second
15 member fits, the separate member having a formation that fits over said engaged first and second members to hold them together.

10. A hollow building element of plastics material comprising one or more hollow ducts and having at
20 opposite sides thereof coupling members, whereby elements may be connected to each other directly or indirectly, wherein upper coupling members comprise a part engageable with a separate member.

11. A hollow building element of plastics material
25 comprising one or more hollow ducts and having at opposite sides thereof coupling members, whereby

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elements may be connected to each other directly or indirectly, whereby lower coupling members comprise formations that interengage with formations of neighbouring elements and are held together by a separate member.

12. An element as claimed in claim 11, wherein lower coupling members comprise formations that interengage with formations of neighbouring elements and are held together by a separate member.

13. A structure comprising building elements as claimed in any one of claims 1 to 12 coupled together side by side.

14. A structure as claimed in claim 13 having a cap or cover over the area of coupling between adjacent elements.

15. A structure as claimed in claim 14 with any one of claims 4 to 12, wherein the cap or cover is securable to said separate member.

16. A structure as claimed in claim 14 or 15, wherein the cap or cover has at its side edges sealing means in the form of flexible resilient material.

17. A structure as claimed in claim 16, wherein the separate member or stiffening beam has a formation engageable with a formation of the cap or cover to retain the cap or cover in place.

18. A structure as claimed in claim 17, wherein the

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separate member or stiffening beam has a channel formation into which or more depending projections of the cap or cover locate.

5 19. A structure as claimed in claim 18, wherein the cap or cover has two such projections shaped to engage complementary formations on inside surfaces of the channel of the separate member or beam.

10 20. A structure as claimed in claim 19, wherein the projections are resilient and angled away from each other, whereby they will tend to urge outwards when pressed together and so improve engagement in the channel formation.

15 21. A hollow building element substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

22. A building structure substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9313948.3

Relevant Technical fields

- (i) UK CI (Edition L) E1D (DCF, DLEHW, DLEQWCV,
DLEQWDV, DLEQWNV, DLEQWSV)
- (ii) Int CI (Edition 5) EU4D

Search Examiner

D J LOVELL

Date of Search

21.9.93

Databases (see over)

(i) UK Patent Office

(ii)

Documents considered relevant following a search in respect of claims

1-9, 13-22 WHEN APPENDANT THERET

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2243170 A (ULTRAFRAME)	1, 4-7, 13-18
X	GB 2155527 A (ROLKAN)	1, 4, 13
Y	GB 2147334 (AKT J V FABRIKER)	1-3, 13
X	GB 1528874 (EVERLITE)	1, 4-6, 13
X	GB 1511189 (SOKOLER)	1
X	GB 1201427 (LAVORAZIONE)	1
Y	EP 0054856 (BAYER) - see Figure 16	2
X	US 4790112 (WANG)	1, 4, 5, 13, 14, 16

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).